

an electrode disposed on the chamber lid.

35. (Amended) The apparatus of claim 34, wherein the electrode comprises one or more inductive coils.

36. (Amended) The apparatus of claim 34, wherein the electrode comprises one or more flat coils.

REMARKS

This is intended as a full and complete response to the Office Action dated April 28, 2003, having a shortened statutory period for response set to expire on July 28, 2003. Claims 1-35 are pending in this application. Claims 1-35 were considered and stand rejected. Claims 33, 34, and 35 were renumbered as 34, 35, and 36, as to avoid confusion with the previously canceled claim 33, which was canceled in Response to Office Action Dated March 21, 2002. Applicants believe that no new matter has been introduced in this response.

In the specifications, paragraph [0042] was amended to specify the correct reference to Figure 5.

Claims 1-4, 9, 10, 12-20, 23-25 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 9, 10, 14, 15, 24, and 25 were amended to conform with MPEP § 2173.05(b).

The Examiner asserts that the limitation, "substantially tangent," within claims 1, 12, and 23, is unclear regarding how the sidewall 204c is tangent to both the first and second substantially cylindrical regions 204a, 204b. Applicants respectfully traverse the rejection of claims 1, 12, and 23 and claims dependent thereon.

With respect to a top view as shown in Figs. 6A-6C, the Examiner correctly states that each sidewall would touch each cylindrical region at one point if tangent. The Examiner also correctly observes that some of the embodiments in Figs. 6A-6C have

sidewalls between the cylindrical regions wherein the sidewalls are not perfect tangents. Three embodiments of side walls extending substantially tangent between the first and second substantially cylindrical regions are described on page 12, line 10 to page 13, line 16, of the specification and Figures 6A-C. The imperfect embodiments are near tangent and provide Applicant's support for the phrase "substantially tangent". Withdrawal of the rejection is respectfully requested because the Examiner's reasoning demonstrates that the term "substantially tangent" is both supported by the specification and easily understood based on embodiments of the invention.

Claim 1 is rejected under 35 U.S.C. § 102(b) as being anticipated by *Tepman, et al.* (U.S. Patent No. 5,730,801). The Examiner asserts that *Tepman, et al.* discloses all elements as recited in claim 1, including a sidewall (20) substantially tangent between a cylindrical processing region (12) and a cylindrical exhaust region (36). Applicants respectfully traverse this rejection.

Tepman, et al. discloses a cylindrical processing region as a cylindrical compartment 12 in the base 20 of a chamber 10 and a relatively smaller cylindrical exhaust region 36 in the base 20 of the chamber. Both cylindrical regions 12, 36 are connected by an exhaust orifice 22 in the base 20. The exhaust orifice 22 is shown with sidewalls that form a narrow passage as expected for an orifice. (See, col. 6, lines 7-16, and Fig. 1). The Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 are substantially tangent to both cylindrical regions 12, 36. Substantially tangent means not perfectly tangent as stated above and does include a non-tangent narrow passage as asserted by the Examiner.

Tepman, et al. does not teach, show, or suggest a chamber body having an internal volume defined by first and second substantially cylindrical regions and by side walls extending substantially tangent between the first and second substantially cylindrical regions, a substrate support disposed in the internal volume within the first substantially cylindrical region, and an exhaust system connected to a chamber outlet disposed in fluid communication with the second substantially cylindrical region, as recited in claim 1, and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 2-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Benjamin, et al.* (U.S. Patent No. 5,820,723). The Examiner asserts that it would have been obvious to provide an inductive-coupling arrangement for the processing region of *Tepman, et al.*, as taught by *Benjamin, et al.* Claims 2-4 are dependent upon claim 1 and are therefore patentable because claim 1 is patentable. Applicants respectfully request withdrawal of the rejection.

Claims 5-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495). The Examiner asserts it would have been obvious to provide liners to the cylindrical regions of *Tepman, et al.*, as taught by *Shan, et al.* The Examiner further asserts it would have been obvious to provide a plasma confinement flange, a barrier flange and relative diameters of cylindrical regions to the apparatus of *Tepman, et al.* Applicants respectfully traverse this rejection.

Tepman, et al. further discloses that the processing region defined by the first compartment 12 in base 20 is readily removed for cleaning. (See, col. 5, line 63, to col. 6, line 6, and Fig. 1).

Shan, et al. discloses shields 10, 12, 13, 14, 40, 42 and exhaust baffle 14 within a single cylindrical region. The single cylindrical region of *Shan, et al.* comprises a cylindrical processing region atop an annular exhaust region, which are separated by the exhaust baffle.

The present invention comprises first and second substantially cylindrical regions connected by sidewalls extending between the two substantially cylindrical regions. The Examiner asserts no motivation for combining the shields of *Shan, et al.*'s single cylindrical region to the two cylindrical regions of *Tepman, et al.* and of the present invention.

Furthermore, the removable base 20 of *Tepman, et al.* can be removed and cleaned like the shields and exhaust baffle of *Shan, et al.* Therefore, persons skilled in the art would have no motivation to insert liners in the removable base 20 of *Tepman, et al.*

Tepman, et al. and *Shan, et al.*, alone or in combination, do not teach, show, or suggest a chamber body having an internal volume defined by first and second substantially cylindrical regions and by side walls extending between the first and second substantially cylindrical regions, a substrate support disposed in the internal volume within the first substantially cylindrical region, an exhaust system connected to a chamber outlet disposed in fluid communication with the second substantially cylindrical region, and one or more chamber liners defining a substantially cylindrical processing region adjacent the substrate support and an exhaust region adjacent the chamber outlet, as recited in claim 5, and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Claims 34-36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495) as applied to claims 5-10, and further in view of *Benjamin, et al.* (U.S. Patent No. 5,820,723). The Examiner asserts that it would have been obvious to provide an inductive-coupling arrangement for the processing region of *Tepman, et al.*, in view of *Shan, et al.*, as taught by *Benjamin, et al.* Claims 34-36 are dependent upon claim 5 and are therefore patentable because claim 5 is patentable. Applicants respectfully request withdrawal of the rejection.

Claims 11-15 and 19-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495). The Examiner asserts it would have been obvious to provide liners to the cylindrical regions of *Tepman, et al.*, as taught by *Shan, et al.* Applicants respectfully traverse this rejection.

As stated above for claim 5, the removable base 20 of *Tepman, et al.* can be removed and cleaned like the shields and exhaust baffle of *Shan, et al.* Therefore, persons skilled in the art would have no motivation to insert liners in the removable base 20 of *Tepman, et al.*

Tepman, et al. and *Shan, et al.*, alone or in combination, do not teach, show, or suggest a chamber body having an internal volume, one or more liners defining a substantially cylindrical processing region and a substantially cylindrical exhaust region within the internal volume, wherein the substantially cylindrical processing region

communicates with the substantially cylindrical exhaust region through one or more openings defined by the one or more liners, a substrate support disposed in the substantially cylindrical processing region, and an exhaust system in communication with the substantially cylindrical exhaust region through an exhaust port in the process chamber, as recited in claim 11 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Applicants further traverse the rejection of claims 12-15 on grounds that the Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 in *Tepman, et al.* are substantially tangent to both cylindrical regions 12, 36. Substantially tangent as recited in claims 12-15 means not perfectly tangent as stated above for claim 1, and does include a non-tangent narrow passage as asserted by the Examiner. Applicants respectfully request withdrawal of the rejection.

Claims 13-14 and 19-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495) as applied to claims 11-15 and 19-20 above. The Examiner asserts it would have been obvious to provide a plasma confinement flange, a barrier flange and relative diameters of cylindrical regions to the apparatus of *Tepman, et al.* Claims 13-14 and 19-20 are dependent upon claim 11 and are therefore patentable because claim 11 is patentable. Applicants respectfully request withdrawal of the rejection.

Applicants further traverse the rejection of claims 13-14 on grounds that the Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 in *Tepman, et al.* are substantially tangent to both cylindrical regions 12, 36. Substantially tangent as recited in claims 13-14 means not perfectly tangent as stated above for claim 1 and does include a non-tangent narrow passage as asserted by the Examiner. Applicants respectfully request withdrawal of the rejection.

Claims 16-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495) as applied to claims 11-15 and 19-20 above, and further in view of *Benjamin, et al.* (U.S. Patent No. 5,820,723). The Examiner asserts that it would have been obvious to provide an inductive-coupling arrangement for the processing region of *Tepman, et al.*, in view of *Shan, et al.*, as taught by *Benjamin, et al.* Claims 16-18 are dependent upon

claim 11 and are therefore patentable because claim 11 is patentable. Applicants respectfully request withdrawal of the rejection.

Applicants further traverse the rejection of claims 16-18 on grounds that the Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 in *Tepman, et al.* are substantially tangent to both cylindrical regions 12, 36. Substantially tangent as recited in claims 16-18 means not perfectly tangent as stated above for claim 1, and does include a non-tangent narrow passage as asserted by the Examiner. Applicants respectfully request withdrawal of the rejection.

Claims 21-25 and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495). The Examiner asserts it would have been obvious to provide liners, a plasma confinement flange and a barrier flange to the cylindrical regions of *Tepman, et al.*, as taught by *Shan, et al.* Applicant respectfully traverse this rejection.

As stated above for claim 5, the removable base 20 of *Tepman, et al.* is more easily removed and cleaned than the shields and exhaust baffle of *Shan, et al.* Therefore, persons skilled in the art would have no motivation to insert liners in the removable base 20 of *Tepman, et al.*

Tepman, et al. and *Shan, et al.*, alone or in combination, do not teach, show, or suggest a chamber body comprising an internal volume and an exhaust port, and one of more liners defining an exhaust region and a processing region within the internal volume, wherein the exhaust region is co-axial with the exhaust port and the processing region is on a parallel axis with the exhaust region, as recited in claim 21 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

Applicants further traverse the rejection of claims 23-25 on grounds that the Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 in *Tepman, et al.* are substantially tangent to both cylindrical regions 12, 36. Substantially tangent as recited in claims 23-25 means not perfectly tangent as stated above for claim 1, and does include a non-tangent narrow passage as asserted by the Examiner. Applicants respectfully request withdrawal of the rejection.

Claims 22 and 24-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.*

(EP 0814495) as applied to claims 21-25 and 29 above. The Examiner asserts it would have been obvious to provide a plasma confinement flange and relative diameters of cylindrical regions to the apparatus of *Tepman, et al.* Claims 22 and 24-25 are dependent upon claim 21 and are therefore patentable because claim 21 is patentable. Applicants respectfully request withdrawal of the rejection.

Applicants further traverse the rejection of claims 24-25 on grounds that the Examiner has no basis for asserting that the narrow sidewalls of the exhaust orifice 22 in *Tepman, et al.* are substantially tangent to both cylindrical regions 12, 36. Substantially tangent as recited in claims 24-25 means not perfectly tangent as stated above for claim 1, and does include a non-tangent narrow passage as asserted by the Examiner. Applicants respectfully request withdrawal of the rejection.

Claims 26-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495) as applied to claims 21-25, and 29 above, and further in view of *Benjamin, et al.* (U.S. Patent No. 5,820,723). The Examiner asserts that it would have been obvious to provide an inductive-coupling arrangement for the processing region of *Tepman, et al.*, in view of *Shan, et al.*, as taught by *Benjamin, et al.* Claims 26-28 are dependent upon claim 21 and are therefore patentable because claim 21 is patentable. Applicants respectfully request withdrawal of the rejection.

Claims 30-32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tepman, et al.* (U.S. Patent No. 5,730,801) in view of *Shan, et al.* (EP 0814495). The Examiner asserts it would have been obvious to provide liners, a plasma confinement flange and a barrier flange to the cylindrical regions of *Tepman, et al.*, as taught by *Shan, et al.* Applicant respectfully traverse this rejection.

As stated above for claim 5, the removable base 20 of *Tepman, et al.* can be removed and cleaned like the shields and exhaust baffle of *Shan, et al.* Therefore, persons skilled in the art would have no motivation to insert liners in the removable base 20 of *Tepman, et al.*

Tepman, et al. and *Shan, et al.*, alone or in combination, do not teach, show, or suggest an apparatus for configuring a processing chamber, comprising one or more chamber liners defining a substantially cylindrical processing region and a parallel

substantially cylindrical exhaust region, wherein the substantially cylindrical processing region communicates with the substantially cylindrical exhaust region, as recited in claim 30 and claims dependent thereon. Applicants respectfully request withdrawal of the rejection.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the method or apparatus of the present invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the amendments be entered and the claims be allowed.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES

IN THE SPECIFICATION:

[0042] In a further aspect of the invention, the passage region includes traps to prevent plasma escaping from the process region into the passage or exhaust regions. Plasma or process gas flow can be controlled by a flow control flange 422 disposed on an outer surface of the substrate support 410. In this embodiment, the plasma flow or process gas flow is restricted to the space between the inner surface of the plasma confinement portion 414 of the upper liner 404 and the outer surface of the flow control flange 422. Another embodiment includes flow control flanges 412 and 422 disposed on the upper liner 404 and the substrate support 410, respectively, as shown in Figure [4] 5. The plasma flow or processing gas flow is restricted as indicated by arrows A.

IN THE CLAIMS:

9. (Amended) The apparatus of claim 5, wherein the first substantially cylindrical region has a first diameter at least [about] 30% larger than a second diameter of the second substantially cylindrical region.

10. (Amended) The apparatus of claim 5, wherein the first substantially cylindrical region has a first diameter at least [about] 20% larger than a substrate support diameter.

11. (Amended) An apparatus for processing a substrate, comprising:
a chamber body having an internal volume;
one or more liners defining a substantially cylindrical processing region and a substantially cylindrical exhaust region within the internal volume, wherein the substantially cylindrical processing region communicates with the substantially cylindrical exhaust region through one or more openings [in] defined by the one or more liners;
a substrate support disposed in the substantially cylindrical processing region;
and

an exhaust system in communication with the substantially cylindrical exhaust region through an exhaust port in the process chamber.

14. (Amended) The apparatus of claim 13, wherein the first substantially cylindrical region has a first diameter at least [about] 30% larger than a second diameter of the second substantially cylindrical region.

15. (Amended) The apparatus of claim 13, wherein the first substantially cylindrical region has a first diameter at least [about] 20% larger than a substrate support diameter.

16. (Amended) The apparatus of claim [12] 11, further comprising a chamber lid mounted on the chamber body and an electrode secured to the chamber lid.

19. (Amended) The apparatus of claim [12] 11, wherein the one or more openings [in] defined by the one or more liners are adjacent the substrate support.

20. (Amended) The apparatus of claim [12] 11, wherein the one or more liners comprise a plasma confinement flange surrounding the substrate support.

24. (Amended) The apparatus of claim 23, wherein the first substantially cylindrical region has a first diameter at least [about] 30% larger than a second diameter of the second cylindrical region.

25. (Amended) The apparatus of claim 23, wherein the first substantially cylindrical region has a first diameter at least [about] 20% larger than a substrate support diameter.

[33]34. (Amended) The apparatus of claim 5, further comprising:
a chamber lid mounted on the chamber body; and
an electrode disposed on the chamber lid.

[34]35. (Amended) The apparatus of claim [33] 34, wherein the electrode comprises one or more inductive coils.

[35]36. (Amended) The apparatus of claim [33] 34, wherein the electrode comprises one or more flat coils.